The relationship between EQ-5D and SF-36 instruments in patients with low back pain

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Research Report

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Purpose: Health-related quality of life measures are crucial in assessing the patients with low back pain. Both the Short Form 36 and the EuroQol-5D are valid and reliable instruments for assessing health-related quality of life in patients with musculoskeletal diseases. This study investigated whether or not these two instruments yield equivalent information on the health-related quality of life of patients with chronic low back pain. **Materials and methods:** One hundred and thirty two patients with chronic low back pain completed both instruments during their enrolment procedure. **Results:** After controlling for some important socio-demographic variables, the partial correlation coefficients showed that there were generally low to moderate (r<0.49) negative correlation between the dimensions of the two instruments. Factor analysis revealed that although there are some similarities, the two instruments did not provide equivalent information on the health-related quality of life of patients with chronic low back pain. **Conclusion:** The results of this study indicate that the instruments are not interchangeable for assessing health-related quality of life in these patients.

Keywords: Low back pain, Quality of life, Questionnaires.

Bel ağrılı hastalarda EQ-5D ve SF-36 ölçekleri arasındaki ilişki

Amaç: Bel ağrılı hastaları değerlendirmede sağlıkla ilgili yaşam kalitesi ölçekleri çok önemlidir. Kas iskelet hastalıkları olan hastalarda sağlıkla ilgili yaşam kalitesini değerlendirmek için hem Kısa Form-36 hem de EuroQol-5D geçerli ve güvenilir ölçeklerdir. Bu çalışma, bu iki ölçeğin kronik bel ağrılı hastaların sağlıkla ilgili yaşam kalitesi hakkında eşdeğer bilgi sağlayıp sağlamadığını araştırdı. **Gereç ve yöntem:** Çalışmanın başlangıcında kronik bel ağrılı 132 hasta her iki ölçeği doldurdu. **Sonuçlar:** Bazı önemli sosyo-demografik değişkenler kontrol edildikten sonra, kısmi korelasyon katsayıları iki ölçeğin boyutları arasında genellikle düşük-orta (r<0.49) negatif korelasyonlar olduğunu gösterdi. Faktör analizi, bazı benzerlikler olmasına rağmen, iki ölçeğin kronik bel ağrılı hastaların sağlıkla ilgili yaşam kalitesi hakkında eşdeğer bilgi sağlamadığını gösterdi. **Tartışma:** Bu çalışmanın sonuçları, bu hastalarda sağlıkla ilgili yaşam kalitesini değerlendirmek için iki ölçeğin birbirlerinin yerine kullanılamayacağını göstermektedir.

Anahtar kelimeler: Bel ağrısı, Yaşam kalitesi, Anketler.

Health-related quality of life (HRQoL) measures are crucial in assessing the person with a chronic disabling condition such as chronic low back pain (LBP). In a systematic literature review, Grotle et al reported that there are at least 10 well-validated questionnaires for use among LBP patients.[1] Two of these questionnaires, the Oswestry Disability Index and the Rolland-Morris Disability Questionnaire, have also been validated in Turkey.[2,3] It is well known that disease-specific instruments do not allow comparisons to be made between low back pain patients with different diseases and with healthy control subjects due to the disease specificity of their questions. Therefore, it is recommended that researchers include a generic instrument together with a disease-specific instrument in order to produce complementary evidence to that provided by the disease-specific instrument and to assess the impact of the disease on HRQoL in comparison with the general population.[4-6] The Medical Outcomes Study 36-item Short Form Health Survey (SF-36) is one such generic instrument. It is a valid, reliable and responsive instrument for use in patients with LBP.[7,8] Koçyiğit H et al. established the validity and reliability of the Turkish version of the SF-36 in 1999.[9] The EuroQol (EQ-5D) is another generic HRQoL instrument designed to be used alongside condition-specific tools as a measure of health outcome. It has been shown that EQ-5D provides valid and reliable information about HRQoL in the general population and in a number of patient groups, including Parkinson's disease,[10] ankylosing spondylitis,[11] inflammatory bowel diseases,[12] schizophrenia[13] and knee osteoarthritis.[14] Although it has been used in economic analysis of health interventions targeted at patients with LBP,[15-17] its clinical usage as an outcome measure in this patient group is limited. An official Turkish version of the EQ-5D is available from the EuroQol Group but measurement equivalence of English and Turkish versions has not been investigated yet.[18]

The content of both the SF-36 and EQ-5D draw from a similar definition of health status.[19] They are both based broadly on the 1946 World Health Organization (WHO) definition of health:

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". It may appear that many of the dimensions of the SF-36 are comparable to those of the EQ-5D when it is looked at in the context of the dimension names: for example, the mobility dimension in the EQ-5D appears to be comparable to the physical function dimension of the SF-36. However, this comparison of dimension names does not really demonstrate the true nature of the similarities or differences. A clearer understanding of the relationship between these instruments should be helpful in comparing studies in which different instruments were used to measure the HRQoL. Furthermore, if these instruments measure the same dimensions of health, then administrating one of them alone may reduce patient contact time. In the literature, there is insufficient published evidence indicating if these two instruments yield equivalent information in patients with chronic LBP. We therefore administrated both the SF-36 and EQ-5D to a group of patients with LBP to determine the patterns of relationship and association between dimensions of the two questionnaires. Operationally, this objective addresses two main questions: 1) Is there a high level of correlation between similar dimensions, and a low level or non-significant correlation between dissimilar dimensions in these instruments in patients with LBP? 2) What is the degree of similarity between the different dimensions of health measured by these instruments?

Material and methods

The patients included in this study were recruited from the outpatient clinic of Physical Medicine and Rehabilitation Department of Başkent University Hospital, Ankara, Turkey, aged 18 years and over, who consulted physiatrists for LBP, during the period December 2005 - April 2006. In this study, we included only patients who have back pain as a result of a back condition. Patients were excluded from the study if they had (1) LBP shorter than 3 months; (2) previous back surgery; (3) hip or knee osteoarthritis; (4) non-spinal conditions that could mimic the low back

pain; or (5) cognitive disorders. Ethical approval was obtained from the Başkent University Council. A total of 170 consecutive patients who had a diagnosis of chronic LBP were approached and 154 (92.4%) gave informed consent to participate in the study. Twenty-two patients were excluded from the study because they did not meet inclusion criteria.

Procedures:

This study was conducted by personal interview and consisted of three main elements: a background questionnaire, the Turkish versions of SF-36, and EQ-5D instruments. The background questionnaire collected information on the socio-demographic characteristics of the participants such as gender (1= Female, 2= Male), age, level of education (1=Illiterate, 2=Primary level, 3=Secondary level, 4=High school level, 5=University Level), marital status (1=Married, 2=Single, 3=Divorced), and duration of LBP. Participants who completed the background questionnaire were then asked to complete the SF-36 and EQ-5D instruments. To remove the ordering bias, these two instruments were administrated in alternate order. Thus, half of the respondents completed the SF-36 first, and the other half completed the EQ-5D first.

Instruments:

The SF-36 is a generic instrument and assesses HRQoL for the last four weeks on eight dimensions of health: physical functioning (PF), role physical (RP), bodily pain (P), general health (GH), vitality (V), social functioning (SF), role emotional (RE), and mental health (MH).[20] All items pertaining to each dimension (excluding health transition) are added and transformed to form a scale from 0 to 100, where a higher score indicates a better state of health or well-being. The EQ-5D consists of a health descriptive system and a visual analogue scale (EQVAS) for respondents to self-classify and rate their health on the day of administration of the instrument.[21,22] The descriptive system has five dimensions (mobility, self-care, usual activities, pain / discomfort and anxiety / depression). Each dimension comprises three levels (no problems, some/moderate problems, and extreme problems). A unique EQ-5D health state is defined by combining 1 level

from each of the 5 dimensions. Thus, EQ-5D generates a total of 243 theoretically possible health states. EQ-5D health states may be converted to a single summary index by applying scores from a standard set of values (or preferences) derived from general population samples to produce an EQ-5D index. The EQ-VAS is a vertical 20 cm visual analogue scale, with the end points labeled best imaginable health state at the top and worst imaginable health state at the bottom, these have numeric values of 100 and 0, respectively.

Statistical analysis:

The Statistical Package for the Social Sciences (SPSS for Windows 9.0) software package was used for statistical analyses. The missing values for each questionnaire were checked prior to further analysis. Spearman's correlation coefficients were calculated to assess the relationships between two ordinal variables or between an ordinal and an interval variable whereas Pearson's correlation coefficients were calculated for two continuous variables. Partial correlation analysis was performed to examine the relationship between the SF-36 and EQ-5D dimensions, with the effects of the socio-demographic variables, which were found to correlate significantly to the dimensions of SF-36 and EQ-5D, being controlled. Correlation coefficients were interpreted based on Davis' set of descriptors: Correlation coefficient = 0.70 or higher: very strong association, 0.50 to 0.69: substantial association, 0.30 to 0.49: moderate association, 0.10 to 0.29: low association and 0.01 to 0.09: negligible association.[23] Then, a factor analysis was performed to examine the degree of similarity between the dimensions of health measured by these instruments. Varimax rotation method was selected to maximize the variance of the squared loadings of a factor on all the variables. The Eigenvalue greater than 1.0 was used to determine the number of factors to retain. With our sample size of 132, we considered factor loadings 0.48 and above to be significant.[24]

Results

As shown in Table 1, the study population consists of 41 male and 91 female patients with

LBP (mean age: 59.4 years). The mean duration of LBP was 76.1±72.7 months (ranged from 4 months to 30 years). Most of the patients were married (63.6%) and had an educational level of high school or above (64.4%). As shown in Table 2, both SF-36 and EQ-5D subscales were significantly correlated with the various socio-demographic characteristics. After controlling for these characteristics, the partial correlation coefficients showed that there were generally low to moderate (r<0.49) negative correlation between the dimensions of the two instruments (Table 3). The highest correlation coefficients calculated between the EQ-5D dimensions and the SF-36 dimensions were as follows: r=-0.40 for the mobility of EQ-5D and the physical functioning of SF-36; r=-0.40 for the usual activities of EQ-5D and the bodily pain of SF-36; r=-0.47 for the self care of EQ-5D and the physical functioning of SF-36; r=-0.35 for the pain/discomfort of EQ-5D and the bodily pain of SF-36; and r=-0.46 for the anxiety/depression of EQ-5D and the mental health of SF-36 (p<0.01).

Table 1. Socio-demographic characteristics of the study population (N=132).

	X±SD
Age (years)	59.4±12.7
Duration of LBP (months)	118.6±143.7
	n (%)
Gender	
Female	91 (68.9)
Male	41 (31.1)
Educational level	
Illiterate	2 (1.5)
Primary level	34 (25.8)
Secondary level	11 (8.3)
High school level	42 (31.8)
University	43 (32.6)
Marital status	
Single	13 (9.8)
Married	84 (63.6)
Divorced	35 (26.6)
LBP: Low back pain.	

As shown in Table 4, using the Eigenvalue greater than 1.0 rule, the factor analysis resulted in three-factors. The first factor was significantly correlated with the mobility, usual activities, self-care, and pain/discomfort dimensions of EQ-5D and the physical functioning dimension of SF-36. The second factor was significantly correlated with the general health, vitality, role emotional, and the mental health dimensions of SF-36 and the anxiety/depression dimension of EQ-5D. The final factor was significantly correlated with the role physical, bodily pain, and the social functioning dimensions of SF-36.

Discussion

The SF-36 and EQ-5D are both multi-dimensional health status measurements, which measure a concept of health based on a range of different dimensions of health. Neither of them reveals identical dimensions in their definition of health; but some broad similarities exist, at least in the context of the names of the dimensions of health. This study provided the first empirical qualitative evidence on the relationship between the EQ-5D and SF-36 instruments in patients with chronic LBP.

The first striking result of this study is the direction of correlations between the SF-36 and EQ-5D dimensions. As is expected, there are negative correlations between the dimensions of the two instruments, even if not all correlations are significant. However, the strength of the correlations obtained between the dimensions of the two instruments, i.e. low to moderate correlations, does not reflect a perfect relationship between them. This finding is consistent with the results of previous studies. In a general population survey conducted by Brazier et al the EQ-5D instrument was found to correlate moderately with the SF-36 instrument.[25] Likewise, Hurst et al noted a moderate correlation between the EQ-5D scales and the SF-36 scales in patients with rheumatoid arthritis.[26]

The factor analysis results showed the mobility and the self care dimensions of EQ-5D, and the physical functioning dimension of SF-36 collected in the first factor.

Table 2. Correlation coefficients between the socio-demographic characteristics and the scores generated by the SF-36 and EQ-5D.

	Socio-demographic characteristics				
	Age	Gender	Educational level	Marital status	Duration of LBP
SF-36					
Physical functioning	-0.21*	0.43**	0.29**	-0.32**	-0.18*
Role physical		0.23**	0.19*	-0.24**	
Bodily pain		0.18*		-0.24**	
General health		0.31**		-0.23**	-0.20*
Vitality		0.29**		-0.22*	
Social functioning		0.24*	0.19*	-0.18*	
Role emotional		0.20*		-0.29**	
Mental health					
EQ-5D					
Mobility	-0.22*	-0.19*			
Usual activities	0.25*	-0.28*	0.20*		
Self-care	-0.20*	-0.22*			
Pain / discomfort	-0.32**	-0.19*			
Anxiety / depression	-0.17*	-0.18*	0.22*		

* Correlation is significant at the 0.05 level (2-tailed), ** Correlation is significant at the 0.01 level (2-tailed).

Table 3. Partial correlation coefficients between the subscales of the SF-36 and the subscales of the EQ-5D.

	EQ-5D subscales				
	MO	UA	SC	PD	AD
SF-36	r	r	r	r	r
Physical functioning	-0.40**	-0.38**	-0.47**	-0.33**	-0.40**
Role physical	-0.23**	-0.33**	-0.23**	-0.10	-0.10
Bodily pain	-0.32**	-0.40**	-0.33**	-0.35**	-0.23**
General health	-0.22*	-0.24**	-0.16	-0.20*	-0.35**
Vitality	-0.06	-0.24**	-0.17	-0.03	-0.28**
Social functioning	-0.17	-0.33**	-0.24**	-0.14	-0.28**
Role emotional	-0.08	-0.10	-0.15	-0.06	-0.36**
Mental health	-0.06	-0.18*	-0.17	-0.02	-0.46**

Control variables = Age, gender, educational level, marital status, and duration of LBP.
* Correlation is significant at the 0.05 level (2-tailed), ** Correlation is significant at the 0.01 level (2-tailed).
MO = Mobility, UA = Usual activities, SC = Self-care, PD = Pain / discomfort, AD = Anxiety / depression.

Table 4. Rotated factor matrix.

	Factor		
	1	**2**	**3**
Physical functioning	-0.59		
Role physical			0.80
Bodily pain			0.73
General health		0.57	
Vitality		0.73	
Social functioning			0.70
Role emotional		0.65	
Mental health		0.85	
Mobility	0.88		
Usual activities	0.71		
Self-care	0.72		
Pain / discomfort	0.67		
Anxiety / depression		-0.69	

Only factor loadings > 0.48 are shown.

This finding suggests that there are some similarities between physical functioning and mobility, and self care. However, the above-mentioned EQ-5D dimensions had relatively higher factor loading scores compared with the physical functioning dimension of SF-36. The low score obtained for the physical functioning dimension of SF-36 suggests that there was also some dissimilarity between this subscale and the EQ-5D subscales, i.e. the mobility, and the self-care subscales. If one looks carefully at the content of these dimensions, it becomes apparent that there are qualitative differences in the content coverage of these dimensions. For instance, the physical functioning dimension of SF-36 includes 10 items (physical limitations in performing vigorous, and moderate activities; in lifting or carrying groceries; in climbing one, and several flights of stairs; in bending, kneeling, or stooping; in walking one, and several blocks, and more than one mile; and in bathing or dressing) whereas the mobility dimension of EQ-5D includes only one activity, i.e. walking. Likewise, the self-care dimension of EQ-5D specifies two basic personal activities (washing and dressing).

The factor analysis results also showed that the role emotional and mental health dimensions of the SF-36 and the anxiety/depression dimension of the EQ-5D loaded on the same factor. This finding was consistent with the result obtained by Oberg and Oberg.[27] However, the strength of the factor loadings suggests that there was also dissimilarity between the anxiety/depression dimension of the EQ-5D and the mental health dimension of the SF-36. A careful examination of the two dimensions reveals there are noticeable differences in the wording of them. Firstly, anxiety/depression dimension asks the respondents directly to indicate whether they are anxious or depressed whereas the other one measures the mental health by indirect items. Secondly, the mental health dimension of the SF-36 also includes positive emotions as well, such as feeling calm and peaceful.

One of the interesting results of the factor analysis was that there was no overlap between the bodily pain dimension of the SF-36 and the pain/discomfort dimension of the EQ-5D, and between the social functioning of the SF-36 and the usual activities of the EQ-5D. This may be a result of the differences in the wording of each dimension. For instance, the bodily pain dimension specifies the pain intensity and its effect on normal work, including housework and work outside, whereas the pain/discomfort dimension describes one or two different symptoms, i.e. pain or discomfort. The social functioning dimension asks respondents specifically to indicate whether their social activities have been affected by their own physical or emotional health problems whereas the usual activities dimension asks only whether there are problems with performing their usual activities such as work, study, housework, family or leisure activities. So, we believe that the usual activities dimension of the EQ-5D also covers non-health-related factors, which may influence social activities. It is well known that socio-demographic characteristics of individuals, such as age, education, gender, and family income influence social interactions.[28] One limitation of this study was that we did not assess the EQ-5D's sensitivity to change, which is important if a HRQoL instrument is to be used in clinical trials to test effectiveness of treatment. This was a cross sectional study with only one evaluation of

HRQoL. This issue should be a priority of further studies.

As a conclusion, our data suggest that even if the SF-36 and EQ-5D are utilized to provide complementary information regarding general HRQoL, these two instruments do not provide equivalent information on the HRQoL of patients with chronic LBP. It appears that both instruments are not interchangeable for assessing HRQoL in this patient group. On the other hand, our findings should be interpreted with caution since the participants were patients from a particular clinic in Turkey.

Acknowledgement

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